

TIDAL POWER CORPORATION

ANNUAL REPORT

1986-1987



NOVA SCOTIA

TIDAL POWER CORPORATION

REPORT BY THE PRESIDENTON THE AFFAIRS OF THE CORPORATIONFOR THE YEAR ENDED MARCH 31, 1987Oil Prices.

The benefits of tidal power development depend largely on the costs of energy from competing sources throughout tidal plant life. Comparative costs of thermal vs. tidal energy are particularly significant during the first decade or so of tidal plant operation. Thermal costs later in plant life have a smaller bearing on profitability and thermal costs before start-up are irrelevant.

Nevertheless, the sharp drop in oil prices during the early months of the year under review was a matter of considerable concern to the Corporation. If that drop signalled a return to prices based on the cost of production from existing reserves, oil would remain cheap through the end of the century, wiping out any opportunity for tidal development within the next decade. If, on the other hand, the drop was merely a short-term response to glutted market conditions, medium-term projections of increasing real prices would remain valid and a relatively early tidal project would remain a reasonable possibility.

While the subsequent apparent success of OPEC in stabilizing prices in the (U.S.) \$18-\$20 range removes some of the uncertainty generated by the collapse, conditions in 1986 were not favourable for new initiatives in alternate energy. Under the circumstances, the Corporation concentrated its efforts on two problems, retiming and fish mortality, which would in any event require resolution prior to large-scale tidal power development in Fundy.

Retiming.

Tidal plants of economical design produce energy intermittently in the form of one or two pulses. While this form of output can be absorbed by utility systems to reduce thermal fuel costs, marketing studies conducted in 1984 as part of the Stage 1 program had indicated that such energy would not be

attractive to the New England Power Pool, the main potential purchaser, unless it could be modified to provide some firm capacity. Such modification requires some form of energy storage. The process of storing energy at the time of production and releasing it when required by the customer is here referred to as retiming.

Various means of retiming exist. The storage capacity of a large hydro system could be utilized. Other commercially proven methods involve hydro pumped storage or compressed air energy storage (CAES). Theoretically possible but unproven methods include inertial or magnetic storage.

Based on preliminary calculations, the Corporation concluded that hydro storage and CAES were relatively best in terms of cost and efficiency. Hydro-Quebec is the only source of high capacity hydro storage and access to that system is by no means assured. By comparison, CAES facilities would not be subject to such potential political or policy constraints. They could be constructed in Nova Scotia. The Corporation therefore decided to pursue this option and it is hoped that a preliminary examination of the geological and other technical aspects of feasibility will be completed in 1987.

Fish Mortality.

Prior to construction of the Annapolis Tidal Generating Station, the only knowledge about the effects of turbine operation on North American fish species had been derived from river hydro operation. For this reason, the Corporation undertook studies of mortality and other factors affecting fish at Annapolis. The mortality studies were commenced in 1985 and completed in 1986. Results indicate that some pelagic species, including shad, alewives, herring and river herring, are less able to withstand the turbulent forces and sudden pressure changes involved in turbine passage than trout, salmon and char, the species of primary concern at many river hydro sites.

Insofar as the Annapolis plant is concerned, the Corporation and Nova Scotia Power Corporation concluded that some effort should be made to divert sensitive species from the turbine to the existing fish passages. For that purpose, the effectiveness of behavioural devices will be researched in 1987.

Regarding the Bay of Fundy, the question of turbine mortality is rendered more pressing by the existence at both potential sites of feeding fish stocks. Whereas most of the fish encountered at Annapolis are anadromous, making one upstream passage and one downstream passage per year, feeding

fish in Minas or Cumberland Basins would be likely to make multiple passages. The Corporation is of the opinion that successful means of fish diversion will have to be found and demonstrated at Annapolis in order to render large-scale development environmentally acceptable.

Other Environmental Aspects.

A New England market for most of the output of a tidal plant at either site A8 or site B9 would be necessary in order to make development of either site feasible. For this reason, U. S. environmental impacts will play an important part in determining the feasibility of development. B9 is the larger and more economically attractive of the two sites. Unfortunately, construction of a barrage in Minas Basin and operation of a tidal plant would increase tidal amplitudes by an average of 12 cm at Boston and slightly more on the Maine coast. Although this is a relatively small change in the tidal regime, it is estimated that the resulting encroachment would affect 17 km² of Maine, turning present dry land into intertidal zone. Research undertaken for the Corporation indicates that this impact could not be avoided by realistic changes in plant design or operating methods.

An increase of 12 cm in tidal amplitude is insignificant in comparison to predicted sea level rise over the next century. During 1986, the Corporation commissioned further research to determine how an increased sea level would affect the heads available for tidal plant operation and the perturbation of the tidal regime caused by such operation. It was found that an increase of 1 m in sea depth would increase tidal ranges at site by 4 cm for A8 and 8 cm for B9, and that the effects of increasing sea level and tidal plants would be approximately additive in the lower Bay and Gulf.

Work by environmental scientists over the past decade has provided much useful information on other environmental effects to be expected from tidal plants in Fundy headwaters. During the year under review, the Corporation prepared a relatively concise summary of predicted changes.

Technical Liaison.

A two-year, £4.26 million study of the Severn Barrage Tidal Power Project started during the year under review. Financed jointly by the U. K. Department of Energy, Central Electricity Generating Board and a consortium of six engineering companies, the study is intended to lead up to a commitment decision on the project. This program follows feasibility studies completed in 1981 and 1985 in which project cost estimates were reduced.

Improvements in the economic status of the Severn Project are partly due to the early closure techniques developed in the Fundy Update '82. The economic status of Fundy has similarly benefited from innovations developed in the 1981 Severn study. The value of technical liaison is readily apparent.

The Government of Canada has taken the initiative in providing the official channel for technology exchange related to the ongoing Severn work. Tidal Power Corporation is involved in this initiative and will also maintain other unofficial contacts.

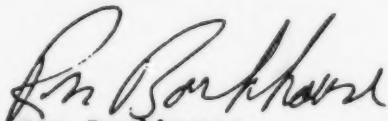
Administrative and Financial.

By Order-in-Council 86-470, Gerald Sheehy, D.V.M., M.L.A., was appointed Chairman of Tidal Power Corporation for a two-year term effective April 24, 1986. By Order-in-Council 86-469, Ron Barkhouse was appointed President and Chief Executive Officer of the Corporation for a term of two years effective April 1, 1986.

Three meetings of the Board of Directors were held during the year.

The Corporation operated within its own administrative budget. Audited financial statements for the year ended March 31, 1987 are appended and form part of this report.

All of which is respectfully submitted as of March 31, 1987.



Ron Barkhouse
President and
Chief Executive Officer

TIDAL POWER CORPORATION
FINANCIAL STATEMENTS
MARCH 31, 1987

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AUDITORS' REPORT

To the Chairman and Directors of
Tidal Power Corporation

We have examined the balance sheet of the Tidal Power Corporation as at March 31, 1987 and the statement of income and surplus for the year then ended, and have obtained all the information and explanations we have required. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion and according to the best of our information and the explanations given to us and as shown by the books of the corporation, these financial statements are properly drawn up so as to exhibit a true and correct view of the financial position of the corporation as at March 31, 1987 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Halifax, Nova Scotia

May 8, 1987

Doane Raymond

Chartered Accountants

Doane Raymond

TIDAL POWER CORPORATIONBALANCE SHEETMARCH 31, 1987

	<u>ASSETS</u>	<u>1987</u>	<u>1986</u>
Current			
Cash and short term deposits		\$16,801	\$32,809
Accounts receivable		<u>12,000</u>	<u>719</u>
		28,801	33,528
Office furniture, at cost less accumulated depreciation of \$3,689 (1986 - \$2,682)		<u>17,954</u>	<u>14,504</u>
		<u>\$46,755</u>	<u>\$48,032</u>
	<u>LIABILITIES</u>		
Current			
Payables and accruals		\$25,536	\$30,298
	<u>SURPLUS</u>		
Surplus		<u>21,219</u>	<u>17,734</u>
		<u>\$46,755</u>	<u>\$48,032</u>

ON BEHALF OF THE BOARD

Director_____
DirectorDoane Raymond

TIDAL POWER CORPORATION
STATEMENT OF INCOME AND SURPLUS
YEAR ENDED MARCH 31, 1987

	<u>1987</u>	<u>1986</u>
Income		
Province of Nova Scotia (Note 2)	\$237,000	\$232,000
Oil Substitution and Conservation Fund		73,000
Interest	<u>715</u>	<u>278</u>
	<u>237,715</u>	<u>305,278</u>
Expenses		
Administration, promotion and travel	130,690	143,797
Audit	1,200	2,850
Depreciation - office furniture	1,007	859
Directors' fees	2,000	2,600
Legal	7,342	11,885
Research studies	<u>91,991</u>	<u>127,670</u>
	<u>234,230</u>	<u>289,661</u>
Excess of income over expenses	3,485	15,617
Surplus, beginning of year	<u>17,734</u>	<u>2,117</u>
Surplus, end of year	<u>\$ 21,219</u>	<u>\$ 17,734</u>

TIDAL POWER CORPORATION
NOTES TO FINANCIAL STATEMENTS

MARCH 31, 1987

1. The Tidal Power Corporation was established by Chapter 21 of the Statutes of Nova Scotia, 1970-71. Order-in-Council 71-379 proclaimed that Chapter 21 of the Statutes of Nova Scotia 1970-71, the Tidal Power Corporation Act, came into force on the 22nd day of April, 1971.
2. Pursuant to Section 16 of the Tidal Power Corporation Act, funds for the purpose of carrying out the objects and powers of the Corporation were obtained from the Province of Nova Scotia. Income for the current year is \$237,000 (1986 - \$232,000).